TITLE OF THE INVENTION

SECTIONAL REFRIGERATOR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 2003-18912, filed March 26, 2003 and Korean Patent Application No. 2002-50238 filed August 23, 2002, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to a sectional refrigerator, and more particularly, to a refrigerator capable of a change in size according to an area of a place for seating the refrigerator.

2. Description of the Related Art

[0003] It is a current trend for refrigerators to become larger, so larger areas are needed to seat conventional refrigerators.

[0004] However, if a user has only a small space available, a large refrigerator occupies too much of this space reducing other utilization of the space.

[0005] Further, sizes of refrigerators entering the market are not changeable and no means are offered to change the size of a refrigerator according to the area of the place for seating the refrigerators, so a user is greatly inconvenienced in seating such refrigerators.

[0006] Although a separable refrigerator is disclosed in Korean patent first publication No.1997-47538, only a freezer compartment and a refrigerator compartment are separable and the size of the refrigerator can not be changed according to the area of the place for seating. Thus, it cannot contribute to solving the problem mentioned above.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an aspect of the present invention to provide a sectional refrigerator whose size can be changed according to the area of a place for seating the refrigerator.

[0008] The foregoing and/or other aspects of the present invention are also achieved by providing a sectional refrigerator comprising a plurality of cooling cabinets forming storage compartments with openings, doors covering the openings of the cooling cabinets, a cool air generating part generating cool air to refrigerate the storage compartment, and a cool air supplying part supplying the cool air generated in the cool air generating part into the storage compartment, wherein the plurality of cooling cabinets are detachably connected to each other in any orientation, forming a shape corresponding to a seating place of the sectional refrigerator.

[0009] According to an aspect of the present invention, a combination of the cooling cabinets forms a hexahedron shape.

[0010] According to an aspect of the present invention, the plurality of cooling cabinets includes at least one first cooling cabinet having a predetermined size, and at least one second cooling cabinet having a size smaller than that of the first cooling cabinet, wherein the number of the second cooling cabinets is a number subtracting the number of the at least one first cooling cabinet from the number of total cooling cabinets.

[0011] According to an aspect of the present invention, the cool air generating part comprises a thermoelectric semiconductor element provided in the cooling cabinet.

[0012] According to an aspect of the present invention, the cool air generating part comprises evaporators provided in the plurality of cooling cabinets, respectively, a compressor compressing cool air for supplying cool air into the each evaporator, and a condenser condensing the compressed refrigerant compressed in the compressor, and the compressor and the condenser are installed in a component chamber.

[0013] According to an aspect of the present invention, the component chamber is provided separately from the cooling cabinet, the condenser and the evaporator are connected through a refrigerant transporting pipe, and the evaporator and the compressor are connected through a refrigerant returning pipe returning refrigerant from each evaporator in the compressor.

[0014] According to an aspect of the present invention, the component chamber is provided in one of the plurality of cooling cabinets.

[0015] According to an aspect of the present invention, the refrigerant transporting pipe is provided with an electronic expansion valve.

[0016] According to an aspect of the present invention, the cool air supplying part comprises a leading duct provided at the backside of the storage compartment and leading the cool air generated in the evaporator into the storage compartment.

[0017] According to an aspect of the present invention, the sectional refrigerator further comprises at least one coupler connecting the refrigerant transporting pipe and the refrigerant returning pipe with the evaporator.

[0018] According to an aspect of the present invention, the compressor, the condenser, the electronic expansion valve and the evaporator form a refrigeration cycle, and the refrigeration cycle further comprises an inverter circuit.

[0019] Additional aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] These features and/or other aspects and advantages of the present invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0021] FIGS. 1 through 3 are perspective views of sectional refrigerators combined by disposing cooling cabinets variously, according to the present invention;

[0022] FIG. 4 is an exploded perspective view of the sectional refrigerator of FIG. 1;

[0023] FIG. 5 shows refrigerant circulation of the sectional refrigerator according to an embodiment of the present invention;

[0024] FIG. 6 is a side, sectional view of a cooling cabinet according to an embodiment of the present invention;

[0025] FIG. 7 is a side, sectional view of a cooling cabinet according to an embodiment of the present invention; and

[0026] FIG. 8 is a side, sectional view of a cooling cabinet according to another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0027] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0028] FIGS. 1 through 4 are perspective views of sectional refrigerators combined by variously disposing cooling cabinets according to the present invention. As shown in FIGS. 1 through 4, a sectional refrigerator 1 is made by connecting a plurality of cooling cabinets 10 to one another.

[0029] Each cooling cabinet 10 has a storage compartment 11, shown in FIGS 6-8, with an opening that is closed with a door 12. Here, the door 12 can be provided rotatably or slidingly relative to the cooling cabinet 10.

[0030] Each storage compartment 11 has at the backside thereof an evaporator 13 as a cool air generating part generating cool air to refrigerate each storage compartment 11, and a cool air supplying part to supply cool air, generated at the evaporator 13, to the storage compartment 11.

[0031] As shown in FIG. 6, the cool air supplying part includes a leading duct 20, located at the backside of the storage compartment 11 leading the cool air from the evaporator 13 into the storage compartment 11, and an air supply fan 21 positioned in the leading duct 20 and sending the cool air from the evaporator 13 to the storage compartment 11.

[0032] As shown in FIG. 5, separate from the cooling cabinets 10, a component chamber 30 is provided so that a refrigeration cycle is formed, generating cool air in each evaporator 13 provided at each storage compartment 11. More than one component chamber 30 may be used.

[0033] Each component chamber 30 is provided with a compressor 31 compressing the refrigerant into a high-temperature and high-pressure state, and a condenser or 32 condensing the compressed refrigerant in the compressor 31. Here, the component chamber 30 is separate from the cooling cabinet 10. However, one or more of the cooling cabinets 10 can be used as component chambers 30 to house the compressors 31 and the condensers 32.

[0034] A condenser 32 is connected with each evaporator 13 through refrigerant transporting pipes 40 so that refrigerant, having passed through the condenser 32, flows into each evaporator 13. The refrigerant transporting pipes 40 are provided with electronic expansion valves 41.

[0035] The electronic expansion valves 41 control the discharge amount of the depressurized refrigerant by controlling an opening extent of the valve according to a load in the refrigeration cycle.

[0036] A compressor 31 is connected with each evaporator 13 through refrigerant returning pipes 42 so that the refrigerant which has passed through the evaporators 13 and completed the heat-exchange flows back into the compressor 31.

[0037] A coupler 43, shown in FIG. 6, installed at the backside of each of the cooling cabinets 10, is used so as to make the refrigerant transporting pipes 40 and the refrigerant returning pipes 42 detachably connectable with the evaporators 13. Here, the refrigerant transporting pipe 40 and the refrigerant returning pipe 42 are connected with the evaporator 13 through one coupler 43. However, as shown in FIG. 8, two couplers 43 may be used, one to connect the refrigerant transporting pipe 40 to the evaporator 13, and the other to connect the refrigerant returning pipe 42 to the evaporator 13.

[0038] A process to generate cool air supplied into each storage compartment 11 through the refrigeration cycle shown in refrigerant circulation of FIG. 5 is described as follows. The refrigeration cycle comprises the compressor 31 operated by electric power 70 discharging refrigerant compressing it into a high pressure and high temperature state, the condenser 32 removing heat from refrigerant discharged from the compressor 31, and the electronic expansion valves 41 depressurizing the high pressure of the refrigerant to an evaporation-pressure. Further, the refrigeration cycle includes the evaporators 13 evaporating the depressurized refrigerant, and an inverter circuit 71 supplying a driving frequency to the compressor 31.

[0039] The output frequency of the inverter circuit 71 is adjusted according to electric power 70 so as to drive the compressor 31 with suitable capacity, thereby reducing energy consumption of the compressor.

[0040] Through this refrigeration cycle, the refrigerant passes through the compressor 31 and the condenser 32 in the component chamber 30 and arrives at each evaporator 13 installed in each storage compartment 11, in which heat-exchange is completed, so that cool air is generated and supplied into the respective storage compartment 11. Then, heat-exchanged refrigerant returns to the compressor 31, thereby controlling the temperature of each storage compartment 11 independently.

[0041] In the above-described embodiment, cool air is generated with a refrigeration cycle. However, as shown in FIG. 7, cool air can be generated and supplied into each storage compartment 11 by installing at least one thermoelectric semiconductor element 60 at the backside of the storage compartment 11.

[0042] The thermoelectric semiconductor element 60 uses a thermoelectric phenomenon generating and absorbing heat, besides Joule heat, according to a current direction when electric current flows in a contact surface of semiconductor material and metal material. In the thermoelectric semiconductor element, the exothermic or endothermic amount can be adjusted according to current intensity, and the exothermic and endothermic direction can be changed according to the current direction. Further, in the thermoelectric semiconductor element, mechanical parts are not required and the place and orientation of installation have no influence on its operation.

[0043] With the configuration of the sectional refrigerator 1 shown in FIGS. 1 through 3, the plurality of cooling cabinets 10 are detachably connectable to each other as desired in any orientation, e.g., vertically, horizontally, in forward and backward directions, and in left and right directions, forming a shape corresponding to a seating place of the sectional refrigerator 1.

[0044] As shown in FIGS. 1 through 3, the sectional refrigerator can be formed by combining cooling cabinets according to the form a user wants, or according to the area of the place for seating the refrigerator. Since the method of assembling sectional refrigerators according to the embodiments of the present invention are similar, only the assembly of a sectional refrigerator as shown in FIG. 1 is described with reference to FIG. 4. For convenience of description, the cooling cabinet 10 is considered to include lower, middle and upper cabinet parts 51, 52, and 53, although alternate arrangements are within the scope of the present invention.

[0045] While a setup method is described using components from FIGS. 1-4 for illustration, other combinations of components may be used: A method of setup of the refrigerator shown in

FIGS. 1 and 4 is described as follows: a lower cabinet 51 is seated, on the bottom, on a place desired for the refrigerator to be seated. Three middle cabinets 52, each of smaller size than the lower cabinet, are stacked on the lower cabinet 51. Thereafter, the three middle cooling cabinets 52 are connected to each other, and an upper cabinet 53 of the same length as the lower cabinet 51 is stacked on the three connected cabinets 52. The line formed by connecting the cabinets 51, 52 and 53 is a straight line, thereby forming the sectional refrigerator 1 so as to exhibit a rectangular appearance. That is, the combination of the cooling cabinets forms a hexahedron shape. The cabinets 51, 52 and 53 are connected to each other with a connector, for example, a sliding engagement or a prominence and depression engagement.

[0046] After the sectional refrigerator is assembled by combining cooling cabinets 10 in the above-described way, electric power is supplied, and the sectional refrigerator is operated.

[0047] The operation of the refrigerator is as follows: refrigerant is compressed into a high pressure and high temperature state by the compressor 31, and then the refrigerant discharged from the compressor 31 is condensed in the condenser 32, traveling to the evaporators 13 through the refrigerant transporting pipes 40 and completing the heat exchange at the evaporators 13. The cool air generated in the above-described way is supplied to the storage compartments 11. Here, since an evaporator 13 is provided at each cooling cabinet 10, the cool air is supplied to each respective storage compartment 11 from the evaporator 13 positioned at the backside of the corresponding storage compartment 11.

[0048] The sectional refrigerator 1, according to the present invention, can have various sizes according to the demand of a user by combining and taking apart of the cooling cabinets 10 of various sizes, in other words, a user can change the size of the refrigerator according to his/her demand. Thus, the present invention can solve the difficulty in the choice of a place for seating the refrigerator and the difficulty in carrying the refrigerator. Further, if a user needs an addition of the storage compartment 11 for storing additional items, this need can be met easily by combining an additional cooling cabinet 10 to the already combined refrigerator.

[0049] In the above-described embodiment, the component chambers 30 housing the compressors 31 and the condensers 32 are separate from the cooling cabinets 10, but the component chambers 30, including the compressors 31 and the condensers 32, may be positioned inside one of more cooling cabinets or inside another cabinet that is detachably connected with the cooling cabinets 10.

[0050] The combining type of a refrigerator 1 is not limited to the types shown in FIGS. 1 through 4, as it is also possible to form various sectional refrigerators by combining cooling cabinets of various sizes in various ways according to the choice of a user. Further, the sectional refrigerator may be placed in a preset cabinet.

[0051] As above described, the present invention offers a refrigerator capable of a change in size according to an area of the place for seating the refrigerator and, thus, facilitate the utilization of the place seating the sectional refrigerator.

[0052] Although a few embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims and their equivalents.